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The Usefulness of Consumer Confidence Indexes in the United States

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The views expressed in this paper are those of the authors.
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Abstract

This paper assesses the usefulness of consumer confidence indexes in forecasting aggregate consumer spending in the United States. The literature generally dismisses the relevance of these indexes. Without formal modelling, however, some researchers (Garner 1991 and Throop 1992) suggest that the indexes could be helpful during periods of major economic or political shocks. Such periods are usually associated with high volatility of consumer confidence, suggesting that large swings in confidence could be useful indicators of consumption. Our work distinguishes itself from previous research in that we provide a rigorous assessment of this possibility by estimating a consumption function in which only large variations of confidence can affect spending. Our results show that economists and forecasters should pay attention to consumer confidence, especially in times of elevated economic or political uncertainty.

JEL classification: D12, E21, E27

Bank classification: Domestic demand and components; Economic models; International topics

Résumé

Les auteurs procèdent à l'évaluation du contenu informationnel des indices de confiance des consommateurs à des fins de prévision des dépenses de consommation agrégées aux États-Unis. Alors que la littérature tend à accorder peu d'importance à ces indices, certains chercheurs, notamment Garner (1991) et Throop (1992) estiment que ces indices pourraient être utiles durant les périodes de chocs économiques ou politiques majeurs. Ces dernières sont généralement caractérisées par une grande volatilité de la confiance des consommateurs, ce qui donne à penser que de les variations des indices concernés pourraient être d'assez bons indicateurs de l'évolution de la consommation. La présente étude se distingue des recherches antérieures par l'examen rigoureux qu'elle fait de cette possibilité. Elle part de l'estimation d'une fonction de consommation dans laquelle seules les fortes variations de la confiance peuvent influencer les dépenses de consommation. Les auteurs concluent que les économistes devraient prêter attention aux indices de confiance des consommateurs, surtout en période d'incertitude économique ou politique élevée.

Classification JEL : D12, E21, E27

Classification de la Banque : Demande intérieure et composantes; Modèles économiques; Questions internationales

In normal times, these measures, in my view, offer relatively little predictive power for household spending. During the Gulf War, however, we learned . . . that in extraordinary times consumer confidence can change abruptly in a way not foreshadowed by the incoming economic indicators. Another way of saying this is that sometimes the equations we use to predict consumer confidence make dramatic forecast errors. Such errors may indicate an "exogenous" psychological shock and thus provide additional information to forecasters.

Laurence Meyer, former Federal Reserve Governor (2001)

1. Introduction

The Consumer Sentiment Index published by the University of Michigan (hereafter the UM index) and the Consumer Confidence Index issued by the Conference Board (hereafter the CB index) are the two most commonly monitored measures of consumer confidence in the United States.¹ These indexes, which are constructed from answers to survey questions, are popular with the media; journal articles and commentaries abound following their release. The analysis often confers a primary role to consumer confidence in determining economic fluctuations. The view among economists, however, is more equivocal. As early as 1965, Adams and Green found that the information contained in the UM index overlaps the information included in standard government statistics on employment and financial conditions. Many economists think that consumer confidence is endogenous and is a reflection of current macroeconomic conditions, whereas others, in line with Keynes' notion of animal spirits, argue that psychological factors that are not captured by economic variables can influence consumers' decisions. According to the latter economists, willingness to consume may be an important factor affecting consumption.

Few studies have found that confidence indexes have significant explanatory power once fundamental economic factors are taken into account. Garner (1991) and Throop (1992), however, performed event studies and suggested that these indexes could be helpful during major economic or political events, as they then tend to diverge from a path consistent with other macroeconomic variables. Drawing on this literature, our study provides a new evaluation of consumer confidence indexes as predictors of aggregate consumer spending.

Periods of high economic or political uncertainty are usually associated with increased volatility of consumer confidence, suggesting that large swings in confidence could influence consumption. We provide a formal assessment of this possibility by estimating a consumption function in which only large variations of confidence affect spending. We find that consumer confidence is a statistically important determinant of consumption in periods of high uncertainty, even after controlling for other determinants of consumption.

1. Other surveys, such as that conducted by ABC/*Washington Post*, are conducted on a sporadic basis.

This paper is organized as follows. Section 2 describes two views of consumer behaviour. Section 3 reviews the relevant empirical literature. Section 4 introduces our econometric model, data, and estimation methods. Section 5 summarizes the estimation and forecasting results. Section 6 concludes. The appendixes document the UM and CB indexes, and provide the survey questions.

2. Theory

This section reviews the theory of consumer behaviour and discusses possible links to consumer confidence. Friedman (1957) argues that consumption is determined on the basis of an individual's income over their lifetime. The permanent income hypothesis (PIH), as this theory is known, states that consumers' expenditures depend on their permanent income. Transitory changes in income do not affect consumption.² Formally, the PIH can be written as:

$$C_t = Y_{Pt}, \quad (1)$$

where C_t is consumption at time t and Y_{Pt} is permanent income at time t . Consumption and permanent income would therefore be equal in each period. Permanent income is defined as the current value of wealth:

$$Y_{Pt} = r \left[A_t + \sum_{i=0}^{\infty} \rho^{i+1} E_t Y_{Lt+i} \right], \quad (2)$$

where r is the real interest rate, A_t is the real value of the individual's wealth at the beginning of period t , $\rho=1/(1+r)$ is the discount factor, Y_{Lt} is real labour income, and E_t is the expectation operator conditional on information available to the individual at time t .

Hall (1978) finds that, under perfect capital markets, the PIH can be approximated by a random walk, thus concluding that no past information can help predict current consumption. Campbell and Mankiw (1990) test the random-walk hypothesis by separating consumers into two groups: "life-cyclers" (who consume from their permanent income) and "rule-of-thumbers" (who consume from their current income). They find a share of about 0.5 for each consumer type, thereby suggesting that the PIH holds only for a portion of the population. This shortcoming of the PIH is not attributable to data aggregation. Indeed, Shea (1995) uses micro data to find that

2. A rise in income will increase consumption only to the extent that this rise reflects a gain in permanent income. This could explain why temporary tax cuts appear to have much smaller effects than permanent cuts (Steindel 2001).

predictable changes in income produce predictable changes in consumption, which is called excess sensitivity of consumption relative to income (Flavin 1981).

Excess sensitivity is explained by two factors: liquidity constraints and precautionary savings. "Liquidity constraints" means that, if individuals are unable to borrow as desired (because access to credit is limited or interest rates are too high), their consumption may be determined by their current income as opposed to their permanent income. "Precautionary savings" means that uncertainty relative to future income can be such that individuals attain higher expected utility by reducing current consumption and building reserves in the advent of a drop in income.

The fact that consumer confidence can help forecast consumption is, in itself, not consistent with the pure PIH. The usefulness of consumer confidence indexes should thus stem from the fact that they capture information about expected income in a situation where current consumption cannot respond because of liquidity constraints or uncertainty.

A more psychological approach to consumption was pioneered by Katona (1975). In Katona's view, consumer expenditures are a function of both capacity and willingness to consume. In this paradigm, consumption depends on the confidence that individuals have regarding their future financial condition. The cornerstone of the psychological theory is that willingness to consume cannot be explained only by the reaction of consumers to economic variables. Their willingness to buy is also influenced by unquantifiable or non-economic factors, such as political crises or wars. According to this view, a drop in confidence can, by itself, cause a decline in consumption in a way not foreseen by economic variables (i.e., without a decrease in income).

The main factor of this approach is uncertainty (current or expected). Indeed, the concept of willingness to consume is negatively related to uncertainty (Acemoglu and Scott 1994). Even if the consumers' financial position is unchanged, higher perceived uncertainty relative to that position can lead to a drop in consumption, as higher uncertainty lowers marginal propensity to consume. In this context, the usefulness of confidence comes from its ability to convey consumers' assessment of risk. This assessment should affect spending plans only to the extent that this uncertainty translates into economic uncertainty. Therefore, the psychological view can be reconciled with the need for precautionary savings.

3. Review of Empirical Literature

In this section, we summarize the empirical literature on the use of consumer confidence indexes in a consumption function. We begin by briefly reviewing the control variables typically found in these analyses.

3.1 Control variables

To evaluate the informational content unique to confidence indexes, they must be purged of information that could come from their determinants. The use of such variables in a consumption equation will ensure that the addition of confidence indexes provides further explanatory power only to the extent that the indexes capture information relative to expected income, credit constraints, uncertainty, or at least information not found in standard macroeconomic data. These control variables are:

- disposable income (a proxy for expected income);
- unemployment rate (a proxy for precautionary savings);
- inflation (a proxy for uncertainty)³;
- interest rates and stock prices (proxies for any information from financial markets)⁴; and,
- wealth (a proxy for permanent income or financial distress).

The information contained in these determinants can be evaluated by calculating the R^2 of the following regression equation:

$$CCI_t = \lambda + \beta X_t + v_t, \quad (3)$$

where CCI stands for a consumer confidence index, and X is a vector containing its determinants. Using the aforementioned determinants, we find that about 72 per cent of the variation in confidence indexes can be explained by these determinants.

Thus, some of the variations in consumer confidence cannot be explained by standard macro variables, suggesting that v_t could be used in a consumption equation to assess the incremental explanatory power of confidence. In our empirical model, however, we chose to use confidence itself with the addition of the components of X , because it involves only one estimation step.

3. As the volatility of inflation increases with its level, higher inflation generates uncertainty around expectations of real wage gains. Lovell and Tien (2000) analyze the link between the Economic Discomfort Index (EDI) and the UM index. The EDI, which is the sum of the unemployment rate and the inflation rate, gives a measure of economic malaise or uncertainty. The authors obtain a correlation coefficient of about -0.80 between the UM index and the EDI, suggesting that confidence indexes are good proxies for uncertainty relative to income.
4. The value of consumer confidence indexes might come from the timeliness of their release, as they are available with almost no time lag. The UM index, for example, is typically released at the end of the month for which data are collected. By contrast, statistics that measure economic activity such as output, consumption, and inflation are released weeks after the end of the reporting month or quarter. As a result, financial variables can be used to control for any effects that could stem from the timeliness of the release of confidence indexes. This timeliness advantage has been found to be relatively small (Fuhrer 1993). For more details on consumer confidence and the stock market, see Otoo (1999).

3.2 Forecasting value

Empirical analysis of consumer confidence is generally performed by estimating a Keynesian consumption function of the following form:

$$\Delta C_t = \alpha + \pi \Delta L^{j+1}(C_t) + \sum_{i=1}^n \beta_i \Delta L^j(X_{it}) + \tau \Delta L^j(CCI_t) + \varepsilon_t \quad j=0, \dots, m, \quad (4)$$

where C represents consumption, X represents a vector of n control variables, CCI stands for a consumer confidence index, and L is a polynomial lag operator.⁵ In some studies, in line with the PIH, cointegrating vectors between consumption, income, and wealth are added as long-run anchors.

In-sample performance is evaluated by calculating the increment to the goodness of fit of the model ($\bar{R}^2$) resulting from the addition of the indexes to the equation, or by looking at the change in significance statistics (t,F) following the inclusion of controls. Out-of-sample performance is assessed by the reduction in forecasting errors as measured by the root-mean-squared error (RMSE).

The findings in the empirical literature on consumer confidence indexes can be divided into three groups: (i) the indexes are of negligible value because they lose their explanatory power with the addition of control variables; (ii) they have an incremental explanatory value, since they contain information over and above that held in the controls; or (iii) they are useful because they improve forecasts of consumption during exceptional periods. Garner (1991) concludes that these diverging results are attributable to three factors:

- The information set differs between studies. Some studies link consumption to confidence and to only one or two variables, whereas others consider a broader set of control variables.
- The lag structure and the forecasting horizon are different. Some focus on a contemporaneous relationship between the variables, whereas others give much more importance to the dynamic effect of explanatory variables.
- The sample period is different. Since confidence appears to be especially useful to forecast consumption during extraordinary periods, the likelihood of concluding that confidence indexes are helpful is greater when such periods are covered.

5. Zero order ($j=0$) can be used to assess coincident indicator properties.

3.2.1 *Negligible value*

The analysis of a consumption equation such as (4) frequently leads authors to give negligible value to consumer confidence indexes. Fuhrer (1993) finds that the UM index is a statistically significant predictor of consumer spending, but that its explanatory power fades in the presence of income in the equation. Hymans (1970), Mishkin (1978), Burch and Gordon (1984), and Garner (1991) also find that confidence indexes lose their significance with the addition of controls. Only Carroll, Fuhrer, and Wilcox (1994) find a predictive value for the UM index once controls are taken into account, but their results are dismissed by Ludvigson (1996) on the basis that their residuals are serially correlated.

3.2.2 *Intrinsic value*

Other researchers (Matsusaka and Sbordone 1995, Bram and Ludvigson 1998, Howrey 2001, Souleles 2001, and Mourougane and Roma 2002) find that consumer confidence indexes depict idiosyncratic variations that are useful for explaining consumption or economic activity. Bram and Ludvigson find that the CB index reduces the forecasting error by 10 per cent between 1982 and 1996 while the UM index increases the forecasting error by 1.4 per cent over the same period. They also find that forecasting accuracy has deteriorated since 1990, as the addition of the CB and UM index raises the RMSE by 4.2 per cent and 3.7 per cent, respectively. Finally, looking at the explanatory power of each survey question, they find that some questions are more useful than others to forecast consumption. This means that a closer look at the source of the changes in the indexes could help to better infer implications for consumption.⁶

3.2.3 *Value in extraordinary times*

Consumer confidence indexes could be useful during periods of elevated uncertainty, such as wars. For example, as Garner (1991) states:

Had the Gulf crisis been widely anticipated, uncertainty might have risen before the actual invasion. As a result, consumer spending might have weakened, and past macro-economic data might have foreshadowed further declines in consumer spending. But in actuality, past economic data probably did not reflect greater uncertainty because the invasion surprised nearly all U.S. households. The abrupt decline in confidence after the invasion provided potentially useful information to forecasters about the reaction of consumers.

6. In a related study for Canada, Côté and Johnson (1998) find that the addition of a consumer confidence measure increases the explained variation in consumption by 18 percentage points.

In line with Garner, Throop (1992) finds that, in times of major economic or political events (the Gulf War and the 1987 stock market crash), consumer confidence can move independent of current economic conditions. At such times, he argues, confidence provides useful information about future consumer expenditures that is not otherwise available. Using a vector-error-correction model (VECM) framework, he finds that the variables that usually explain confidence fail to do so during the Gulf War. During this period, confidence dropped markedly, and did not follow a path consistent with that given by a cointegration relation among confidence, unemployment, inflation, and interest rates. This behaviour of confidence was helpful, since consumer spending followed the path of confidence during that period.⁷ This fact is supported by Santero and Westerlund (1996), who argue that strong variations in confidence, which are likely driven by major events, are often followed by fluctuations in GDP.

Periods of high economic or political uncertainty are often associated with high volatility of consumer confidence, suggesting that large swings in confidence are particularly important for consumption. Using the standard controls, Garner (1991) finds that the addition of consumer confidence worsens forecasting accuracy during "normal" times, but improves it during the Gulf War. This suggests that we should ignore consumer confidence indexes during "normal" periods. However, Leeper (1992) finds that large shocks to consumer confidence are not systematically linked to economic activity as measured by the unemployment rate and industrial production. He confirms Throop's results for the Gulf War period, but not for other periods during which marked changes in consumer confidence were observed.⁸

Analyses of the usefulness of consumer confidence during these exceptional times of high uncertainty are scant. Moreover, they are always focused on predetermined periods, often the Gulf War period. But can we really conclude that confidence indexes are valuable in times of major shocks based only on event studies? In section 4, we formally assess the usefulness of confidence indexes during extraordinary periods, by estimating a consumption function in which only strong variations in confidence can affect spending.

4. Empirical Framework

We construct a small model to test Garner's assertion that consumer confidence indexes are useful to forecast aggregate consumption in periods of major shocks. Instead of focusing on periods of major economic or political events documented in the literature, we propose a more general

7. Decreasing interest rates and inflation led the model to forecast an increase in consumption at that time.

8. Leeper considered 1972–76, 1980–84, and 1990–92 to be exceptional periods.

approach in which periods of high volatility are endogenously determined within a consumption function framework. Before turning to the modelling of confidence, we introduce our benchmark model.

4.1 Benchmark model: a consumption function

To evaluate the usefulness of confidence indexes in explaining and forecasting consumption, we need to estimate a realistic consumption equation with sound theoretical foundations. Our consumption function contains a long-run anchor determined by a cointegrating vector including the level of consumption, income, and wealth (all in real per-capita terms). Moreover, short-run dynamics provide information coming from variables that affect consumption within the business cycle. These variables are the first difference of nominal interest rates, inflation, stock prices, unemployment, and the variables included in the cointegrating vector.⁹ We estimate the following dynamic consumption function:

$$\Delta C_t = \alpha + \pi \Delta L^j(C_t) + \sum_{i=1}^n \beta_i \Delta L^j(X_{it}) + \gamma [C_{t-1} - \lambda_1 Y_{t-1} - \lambda_2 W_{t-1}] + \varepsilon_t \quad j=1, \dots, m, \quad (5)$$

where C_t is total consumer outlays, Y_t is disposable income, W_t is households' net worth (financial and non-financial), and X_{it} represents a vector containing the n short-run dynamic variables.

Given that this is a forecasting equation, the variables and lags kept for the final specification are chosen with the general-to-specific method, as in Hendry and Ericsson (1991). This is the same type of equation as (4), except that we explicitly introduce an error-correction term. Note that this equation does not include any measure of consumer confidence at this stage.

4.2 Threshold specification

Periods of major shocks to uncertainty are frequently associated with strong variations in confidence. We therefore postulate that the explanatory power of the indexes comes from their

9. More precisely, we use quarterly NIPA time series from 1967Q1 to 2001Q4. This sample is conditioned by the availability of both confidence indexes and covers a fairly large number of high-volatility periods. The dependent variable is the change in the log of real consumption per capita, and the following set of control variables is considered: lagged dependent variable, 90-day commercial paper rate (nominal), consumer price index (CPI) inflation, unemployment rate, Standard and Poor's (S&P) 500 stock market index, real disposable income per capita, and real households' net worth per capita (see Appendix A for a complete description of the variables). Income, wealth, and stock market variables can be seen as proxies for credit conditions or liquidity constraints. Separating wealth into assets and liabilities did not improve the fit.

strong variations. In this context, we estimate a model in which only large swings in confidence can affect consumption. If our thinking is correct, the explanatory and forecasting power of our model should be maintained by focusing only on large changes in the indexes. Moreover, if in-sample and out-of-sample properties are improved by doing so, we may conclude that small variations in the indexes should be ignored.

Thus, we estimate a threshold conditioning the inclusion of confidence in the consumption function (5). More precisely, we estimate θ , $\theta > 0$, in the following equality:

$$\Delta CCI_{ir} = \begin{cases} \Delta CCI & \text{if } |\Delta CCI| > \theta \\ 0 & \text{otherwise.} \end{cases} \quad (6)$$

The threshold (θ) is given by a grid search minimizing the sum of squared errors of equation (5) with ΔCCI_{ir} added. This symmetric criterion means that the change in consumer confidence will enter the regression at time t only if its absolute value is larger than θ . Otherwise, zeros replace confidence. The criterion tells us at which magnitude of variation it is worthwhile to include confidence in the regression in terms of better fit (lower empirical errors).¹⁰ However, to ensure the estimation of a threshold confidence variable with minimal noise (such that positive shocks are not immediately followed by negative shocks, or vice versa), we use a smoother criterion for the estimation of θ . The following condition for θ is used in place of (6):

$$\Delta CCI_{ir} = \begin{cases} \Delta CCI & \text{if } |CCI_t - \text{average}(CCI_{t-1}, CCI_{t-2})| > \theta \\ 0 & \text{otherwise.} \end{cases} \quad (7)$$

This criterion means that the change in consumer confidence will enter equation (5) at time t only if the absolute value of the difference between its level and the average level over the two previous quarters exceeds θ . This means that the shock to confidence must be "minimally" persistent.

5. Results

In this section, we describe our base-case model, which will be our benchmark for measuring the usefulness of consumer confidence indexes. Various models based on different threshold specifications are then analyzed.

10. By construction, finding a value of θ different from zero guarantees that the deletion of low-volatility observations is profitable in terms of the consumption equation's fit.

5.1 Benchmark models

After testing for cointegration with the Johansen-Juselius approach, we use the Phillips and Loretan (1991) non-linear least-squares methodology to estimate (5) and obtain long-run parameters over the sample period 1959–2001 for the level of consumption, income, and net wealth (Appendix B, Table B-1).¹¹ Although the estimated parameters should not be interpreted as marginal propensities to consume out of income or wealth (since this is a reduced form), the values are in line with our expectations, because the coefficients are positive, significant, and the income parameter is larger than the wealth parameter.

Because the CB index series starts only in 1967, we use ordinary least squares (OLS) to re-estimate our consumption function over the 1967–2001 period with the long-run parameter values imposed by the 1959–2001 estimation.¹² Using the general-to-specific method, we obtain a final specification (Model 1). This specification excludes income from the short-run dynamics.¹³ Since we want to assess the information content of consumer confidence indexes especially over and above that of income, we consider an alternative equation (Model 2), in which income is significant. More specifically, this model is based on the exclusion of consumption from the equation during the general-to-specific process.¹⁴ Table B-2 in Appendix B gives the estimation results for both models. It also summarizes various diagnostic tests performed on the residuals of these equations.

Both equations perform reasonably well, explaining movements in consumption over the last three decades. Indeed, the $\bar{R}^2$ s are relatively high, given that the equations are not contemporaneous relations. About 37.3 and 29.9 per cent of the variations in consumption can be explained by our explanatory variables for Models 1 and 2, respectively. As well, apart from inflation, which has a positive sign when lagged four periods, all short-run coefficients are statistically significant, and of the expected sign. Moreover, the error-correction term depicts a negative coefficient in both models, a feature consistent with further evidence of cointegration.

5.2 Augmented models

We begin our assessment by reproducing the analysis commonly found in the literature; i.e., by measuring the improvement to the goodness of fit and forecasts of a consumption equation

11. This is the same methodology that Amano and van Norden (1995) use to estimate the Bank of Canada's exchange rate equation.
12. We use the 1959–2001 period, as evidence of cointegration is stronger over this sample.
13. This probably reflects the fact that income and consumption are colinear.
14. The S&P500 is no longer significant.

resulting from the addition of confidence indexes. We include four lags of the confidence indexes (in first difference, since we are interested in changes in the indexes). The sum of the coefficients on these lags is positive and statistically significant for both indexes. In-sample performance is assessed with the increment in the $\bar{R}^2$ s, while out-of-sample performance is examined using the RMSE over the 1990s.¹⁵ We compute one-step-ahead forecasts because we do not provide forecasts for explanatory variables.¹⁶

Results are given in the first and second lines of Table B-3 for the UM index and Table B-4 for the CB index (Appendix B). The RMSEs are shown in parentheses and are expressed relative to the benchmark's RMSEs. The results are broadly consistent with the literature's view that, taken on their own, consumer confidence indexes have little incremental explanatory power. Indeed, the addition of the UM index yields virtually identical $\bar{R}^2$ and RMSEs relative to the benchmark models. The conclusion is, however, more ambiguous for the CB index, as the increment to the goodness of fit is somewhat larger, but the out-of-sample performance is unchanged or worsened.

5.3 Threshold models

We describe two models for volatility thresholds. First, we estimate a model as in (7). Second, we turn to a volatility criterion defined in terms of conditional variance of the residuals. The focus of the analysis is to evaluate the improvement to our consumption function when we replace consumer confidence with the threshold variable in the augmented models. The core of our analysis is consequently to compare the threshold models' performance with that of the augmented models.

5.3.1 Basic thresholds

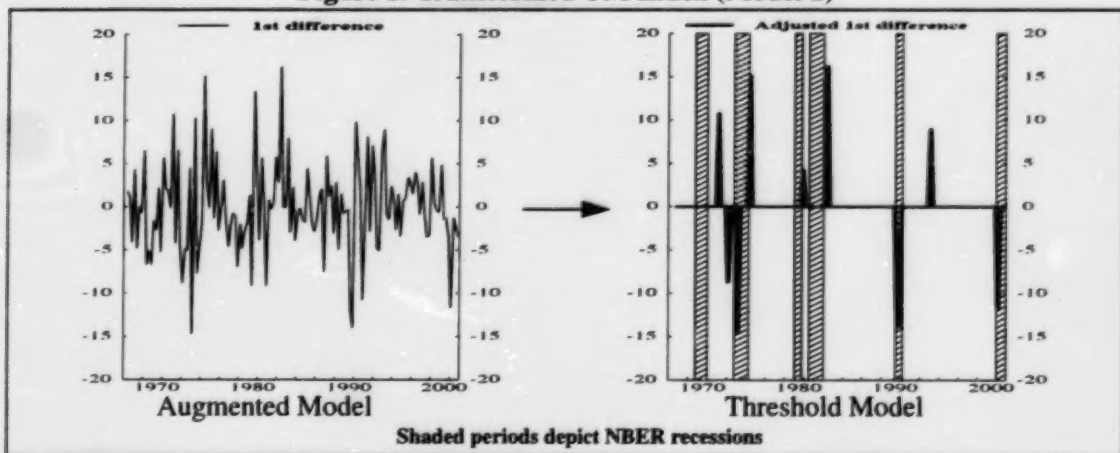
The simultaneous estimation of (5) and (7) over the 1967–2001 period produces interesting results for the parameter θ . For the UM index, values of 10.51 for Model 1 and 10.69 for Model 2 are found. The CB index, however, yields lower results: 0.77 for Model 1 and 1.59 for Model 2, suggesting that our hypothesis is more plausible in the case of the UM index. The lower values for the CB index could be attributed to the fact that, by construction, this series is relatively smooth and consequently depicts very few large variations (see Appendix C).

15. RMSEs are calculated using rolling regressions, starting with 1967–90 as the sample period, moving up one quarter each time to generate a new forecast.

16. This is a reasonable forecasting horizon, since we use quarterly data and we do not expect confidence to affect consumption more than one quarter out.

With these estimates of θ , we can construct series that contain only values that meet the criterion in (7). Because the estimated thresholds are small for the CB index, the original series and the transformed one are virtually identical. On the other hand, the transformed UM series contrasts more with the original series. Figure 1 shows the transformed UM series actually replacing the confidence index in the consumption equation. Coefficients for the threshold variables remain positive and become even more significant than in the augmented models. With this threshold, we can identify high-volatility periods.

Figure 1: Transformed UM Index (Model 2)



The graph on the left shows the confidence variable entering in the augmented models, and the graph on the right shows the confidence variable entering in the threshold models. With this threshold, we identify a relatively small number of periods, which is intuitive. These estimated periods are often consistent with major economic or political events. Moreover, in four of the last five recessions, marked positive variations in confidence were useful in explaining consumption during early recovery periods, thereby suggesting that confidence could be a good proxy for pent-up demand. Although the UM index dropped markedly following 11 September, this drop was not large enough to meet our criterion. This result is reasonable, given that consumption held up very well during the last quarter of 2001. The adjusted series coincides with several turning points in the U.S. economy, in line with the theoretical view that consumer confidence proxies uncertainty because turning points are, by definition, periods of elevated uncertainty.

The third lines of Tables B-3 and B-4 summarize the results with the threshold models. For both indexes, the in-sample performance is significantly improved relative to the benchmark and

augmented models. The increment to the $\bar{R}^2$ varies from 4 to 6 percentage points relative to the benchmark models, and from 1 to 6 percentage points relative to the augmented models. Thus, replacing the confidence indexes by the threshold variables increases the explanatory power, confirming that the relevant information for future consumption coming from confidence is indeed found in its strong variations.^{17,18}

This conclusion would still have been true had the $\bar{R}^2$ only been maintained. Indeed, showing that there is no loss of explanatory power following the deletion of lower volatility observations would have been sufficient to prove that small changes in confidence are not useful. Furthermore, as in Garner (1991), our results suggest that small fluctuations should be ignored. The fact that confidence is especially helpful in periods of high uncertainty is consistent with our interpretation of the psychological approach. This evidence suggests that the indexes convey consumers' assessment of economic risk, and that this assessment can potentially affect spending. Still, our results can also be interpreted as showing that confidence captures expectations relative to income better than other variables do in times of high uncertainty.

Results with respect to the out-of-sample performance are somewhat less obvious. In this case, the RMSE decreases in three out of four cases relative to the augmented models. Still, the improvement to the forecasting errors is impressive with the UM index, as the relative RMSE falls by about 7 percentage points. Our results are not sensitive to a change in the sample period for the estimation of the thresholds. Indeed, changing the threshold estimation period from 1967–2001 to 1967–80 with separate estimation of the consumption function over the 1980–2001 period and forecasting over the 1990s yields similar results.

5.3.2 *Alternative thresholds*

Another method can be used to identify periods of high volatility in consumer confidence indexes. In addition to the above threshold specification, we describe a method based on conditional variance estimation as in Worrell and Leon (2001). In this case, the criterion is:

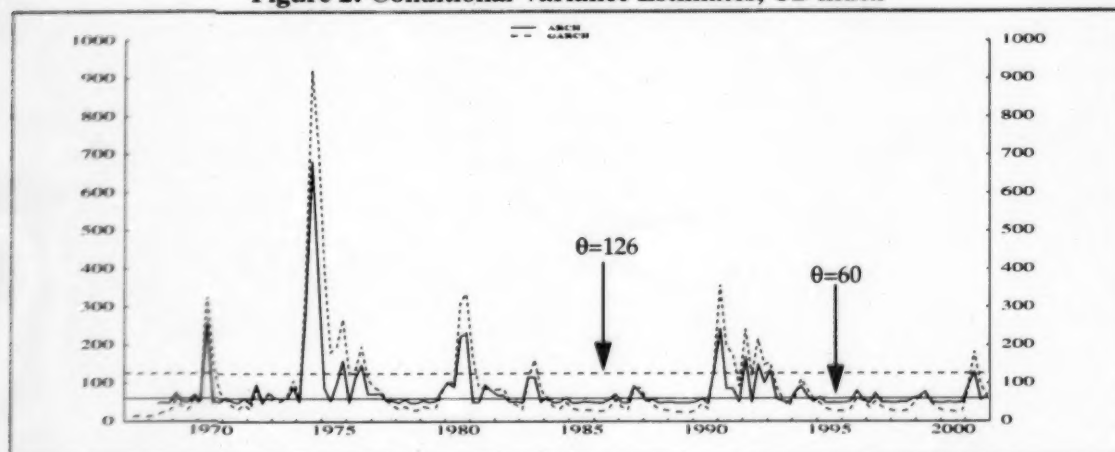
$$\Delta CCI_{it} = \begin{cases} \Delta CCI & \text{if } \sigma(CCI_t) > \theta \\ 0 & \text{otherwise,} \end{cases} \quad (8)$$

17. Another improvement pertains to the increased significance of the error-correction term under the threshold models. This shows that we are able to keep a richer specification with the thresholds, a feature that was absent from the augmented models.

18. These results hold for simpler models that do not include a cointegrating vector.

where σ is an estimate of the volatility of confidence given by the conditional variance of ARCH(1) or GARCH(1,1) models.¹⁹ Figure 2 shows maximum-likelihood estimates of σ for the CB index.²⁰

Figure 2: Conditional Variance Estimates, CB index



Periods of high volatility are easily traceable with these estimates. As in the previous case, they often coincide with recessions. Estimates from the GARCH(1,1) are more persistent, since squared residuals follow an ARMA(1,1) in this case. For example, estimated values for θ are of 60 and 126 for the ARCH and GARCH models with the CB index (Model 1). Points above the horizontal lines, depicting values where $\sigma(CCI)$ meets the criterion, indicate when confidence is useful in explaining consumption.

Estimation and forecasting results are given in lines 4 and 5 of Tables B-3 and B-4 (Appendix B) for the UM and CB indexes, respectively. In-sample performance depicts its strongest improvement in these models, as the $\bar{R}^2$ rises by as much as 9 percentage points. Out-of-sample performance is also reasonably good, especially for the GARCH models of the CB index. In this case, the relative RMSE falls to 0.95. These results reinforce our premise that large swings in consumer confidence are particularly useful.

19. ARCH: autoregressive conditional heteroscedasticity. GARCH: generalized ARCH.

20. We also examined different models based on the standard deviation of consumer confidence indexes. Whether including the eight-quarter rolling standard deviation of confidence itself or estimating a threshold based on this variable, we found some improvement in the in-sample and out-of-sample performance. Still, the best results were found with our basic or alternative thresholds. Moreover, our results are not very sensitive to small changes in θ .

Finally, examining the overall results for the augmented, basic threshold, and alternative threshold models, we find that an increase in the $\bar{R}^2$ is more frequent than a decrease in the forecast errors, as the RMSEs are lowered only 50 per cent of the time. This result shows that in-sample properties can be more easily improved than out-of-sample properties. Overall, the lowest relative RMSEs are obtained with the threshold models: 0.928 for the basic threshold and 0.951 for the alternative threshold (GARCH). Performing standard statistical tests on the equality of the forecasting errors, we find that these two models provide statistically significant lower forecasting errors.

6. Conclusion

Few studies have found that confidence indexes have significant explanatory power once fundamental factors of the economy are taken into account. In line with the literature, we find that, taken on their own, confidence indexes contain relatively little information to forecast aggregate consumer spending in the United States.

Some researchers, however, have suggested that these indexes could be helpful during major economic or political events, as they tend to diverge from a path consistent with other macroeconomic variables in such periods. These periods of high uncertainty are usually associated with strong volatility in consumer confidence, suggesting that large swings in confidence matter for consumption.

We have constructed a simple threshold model that takes into account the magnitude of variation of consumer confidence indexes to forecast consumption expenditures. Whether using our basic thresholds or thresholds founded on conditional variance estimates, in-sample and out-of-sample properties of a consumption equation are generally improved relative to equations that include confidence as it is. This shows that strong variations in confidence matter for consumption, as confidence is a significant predictor of consumption during high-volatility periods. Importantly, these results hold when disposable income is included in the specification, suggesting that confidence contains some information over and above that of income in critical periods.

It remains an open question whether consumer confidence indexes are useful for explaining and forecasting consumption, because of the information they convey relative to consumers' expected income or relative to their assessment of present or expected economic uncertainty. Our contribution has been to show that these indexes are helpful because of the strong variations they register during exceptional periods. It is during periods of high uncertainty that confidence indexes are most likely to affect spending. Echoing Meyer's (2001) comments that we quoted at the outset of this paper, we conclude that economists and forecasters should pay attention to these indexes, especially in times of high uncertainty.

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Appendix A: Sources and Definitions of Variables

Dependent variable

- Change in the log of real consumption (U.S. Department of Commerce, Bureau of Economic Analysis, National Income and Product Accounts) per capita (U.S. Department of Labor, Bureau of Labor Statistics Household Data).

Explanatory variables

- Change in the log of real disposable personal income (U.S. Department of Commerce, Bureau of Economic Analysis, Personal Income & Outlays) per capita.
- Change in the log of Standard & Poor's Stock Price Index (Standard & Poor's Corporation, Trade and Securities Statistics), divided by the GDP deflator (U.S. Department of Commerce, Bureau of Economic Analysis, National Income and Product Accounts).
- First difference of the nominal short-term interest rate (U.S. 90-day commercial paper rate, AA-nonfinancial closing rate, Federal Reserve Web site).
- First difference of the unemployment rate (U.S. Department of Labor, Bureau of Labour Statistics, Household Data).
- Inflation calculated as the change in the log of the CPI, all items (U.S. Department of Labor, Bureau of Labour Statistics).
- Change in the log of net worth per capita (Balance Sheets for the U.S. Economy, Flow of Funds data (C.9)), divided by the GDP deflator.

(Consumer confidence variables are added in the first difference. Please see Appendixes C and D for more details on these series. Source: DRI)

Appendix B: Estimation and Forecasting Results

Table B-1: Cointegration Tests (1959–2001)

Long-run parameter estimates ^a	Unit root tests ^b		Johansen test ^c	
	ADF	dflags	l-Trace	
-0.3413+0.3146w _t +0.6637y _t (-0.802) (2.578) (4.190)	-5.1013	19	30.20 (H ₀ : r=0)	11.48 (H ₀ : r=1)

Notes:

a. *t*-statistics are reported below the parameters estimates.

b. The Augmented Dickey-Fuller (ADF) statistic tests the null hypothesis of non-cointegration (H₀: unit root in the residuals). Critical values for the 1 per cent, 5 per cent, and 10 per cent level are: -3.75, -3.00, and -2.63 (Hamilton 1994).

The optimal lag length for the ADF regression is chosen using the Akaike and Bayesian Information Criteria.

c. Critical values for the 5 per cent level are 26.79 and 13.33 for r=0 and r=1, respectively.

Table B-2: Base-Case Error-Correction Models (without confidence indexes)

Dependent variable: total consumption (1967Q1 to 2001Q4)		
	Model 1	Model 2
ec_{t-1}	-0.0588 (-2.266)	-0.1137 (-4.506)
$Income_{t-1}$		0.1241 (2.108)
$Consumption_{t-2}$	0.2391 (3.242)	
$Consumption_{t-3}$	0.2852 (3.396)	
$S\&P500_{t-1}$	0.0150 (1.705)	
$Int. rate_{t-1}$	-0.0010 (-2.06)	-0.0015 (-3.071)
$Int. rate_{t-2}$	-0.0019 (-3.545)	-0.0028 (-4.843)
$Int. rate_{t-4}$	-0.0010 (-1.946)	-0.0016 (-3.345)
$Unemployment$ $rate_{t-2}$		-0.0095 (-4.778)
$Unemployment$ $rate_{t-3}$	-0.0032 (-1.583)	
CPI_{t-1} inflation	-0.3337 (-2.940)	-0.2283 (-1.960)
CPI_{t-4} inflation	0.3348 (2.916)	0.2358 (2.020)
$\bar{R}^2$	0.373	0.299
ARCH(4)	0.9396	0.8062
Jarque-Bera	0.0037	0.1139
Breusch-Godfrey	0.3089	0.3496
Q-stat(8)	0.7774	0.0798

Notes:

The figures in parentheses are *t*-statistics. The ARCH test is an LM statistic used to test for the presence of autoregressive conditional heteroscedasticity. Jarque-Bera is a test for normality. The Breusch-Godfrey test is for serial correlation in the residuals. The Q-statistic is the Ljung-Box statistic used to test for autocorrelation. The numbers shown for those tests are *p*-values.

**Table B-3: In-Sample and Out-of-Sample Performance
Adjusted R^2 and Relative RMSE
University of Michigan Index**

	Model 1	Model 2
<i>Base case</i>	0.373 (1.00000)	0.299 (1.00000)
<i>Augmented</i>	0.372 (0.99776)	0.301 (0.99433)
<i>Threshold</i>	0.431 (1.02908)	0.363 (0.92817)
<i>ARCH(1)</i>	0.466 (1.02685)	0.357 (1.13043)
<i>GARCH(1,1)</i>	0.410 (1.04027)	0.369 (0.96408)

Notes:

Numbers in parentheses represent relative RMSEs (i.e., divided by the base-case model's RMSE).

Shaded cells indicate lower relative RMSE.

Out-of-sample performance: Estimation period: 1967Q1–1989Q4. Forecasting period: 1990Q1–2001Q4.
RMSE for base-case 1 is 0.00447, RMSE for base-case 2 is 0.00529.

**Table B-4: In-Sample and Out-of-Sample Performance
Adjusted R^2 and Relative RMSE
Conference Board Index**

	Model 1	Model 2
<i>Base case</i>	0.373 (1.00000)	0.299 (1.00000)
<i>Augmented</i>	0.397 (1.05593)	0.355 (0.99622)
<i>Threshold</i>	0.413 (1.05145)	0.369 (0.98866)
<i>ARCH(1)</i>	0.450 (1.02461)	0.359 (1.00189)
<i>GARCH(1,1)</i>	0.409 (0.97092)	0.364 (0.95085)

Notes:

Numbers in parentheses represent relative RMSEs (i.e., divided by the base-case model's RMSE).

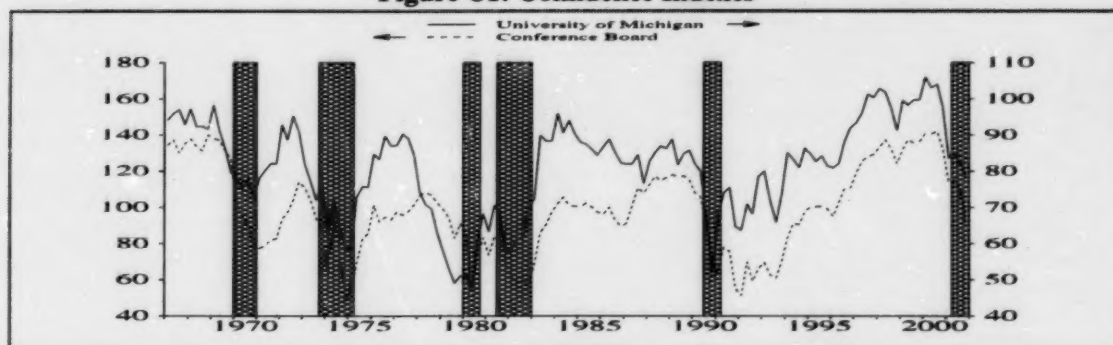
Shaded cells indicate lower relative RMSE.

Out-of-sample performance: Estimation period: 1967Q1–1989Q4. Forecasting period: 1990Q1–2001Q4.
RMSE for base-case 1 is 0.00447, RMSE for base-case 2 is 0.00529.

Appendix C: Documentation

The Consumer Sentiment Index (the UM index) published by the University of Michigan began as an annual survey in the late 1940s. It became a quarterly survey in 1952 before being converted to a monthly survey in 1978. The publication of the Conference Board Consumer Confidence Index (the CB index), on the other hand, started in 1967 on a bimonthly basis and was transformed to a monthly survey in 1977. Both indexes are depicted in Figure C1 below.

Figure C1: Confidence Indexes



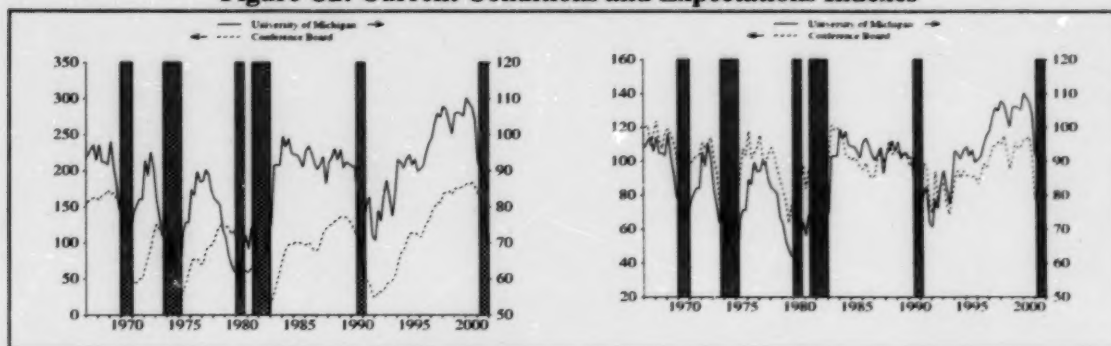
Conceptually, those indexes are used to evaluate the confidence that households have in the economy. They are composed of different questions and can sometimes convey conflicting signals. Such was the case during the 1990–91 recession, when the UM index reached a low point in October 1990 but the CB index did not bottom out until January 1991. Nevertheless, the indexes generally fluctuate at the same time. For instance, the turning point of the last expansion was hit by both attitudinal measures in January 2000.

Each survey contains five specific questions, from which three indexes are constructed: the current conditions index, the expectations index, and the overall consumer confidence index (with a weight of 40 per cent attached to the current conditions index, and 60 per cent to the expectations index). Figure C2 depicts these components for each index.

Because of the nature of the questions, the CB current conditions index reflects the labour market conditions, whereas the UM current conditions index depicts the recent changes in the economy. Therefore, the UM current conditions index tends to lead the economic cycle, while the CB current conditions index tends to follow it. In contrast, the three forward-looking questions about

the future conditions are comparable for both indexes and consequently the prospective indicators for both measures are strongly correlated ($r=0.80$).

Figure C2: Current Conditions and Expectations Indexes



There are key differences in the survey methodologies with respect to the sample size, construction method, timing, and release schedules. The University of Michigan conducts a monthly telephone survey of about 500 households and has a preliminary mid-month release based on 250 phone interviews. The final results are announced by the end of the month.

At the end of the prior month, the Conference Board sends out a mail survey to 5,000 households, with an average response of about 3,500.¹ On the last Tuesday of the survey month, the Conference Board releases preliminary figures (based on about 2,500 responses). The final results are published along with the release of the preliminary results of the ensuing month.

The construction method of the attitudinal measures is similar to that employed in the construction of the diffusion indexes such as the ISM indexes. For the UM index, the procedure consists of adding the number of "positive" responses to 100 and subtracting the number of "negative" replies. On the other hand, the CB index expresses the number of "positive" responses as a percentage of the sum of "positive" and "negative" responses. Those different methodologies in constructing the indexes from the raw response data explain why the CB index takes a wider range of values and the UM index is more volatile. To obtain an index, the current value is simply divided by a base-period level.

1. A selection bias could arise in a case where households dissatisfied with the economic conditions would have a greater probability of responding to the survey. That bias is plausible, since the confidence indexes constitute a tribune for the consumers, given their importance in the media.

Appendix D: Survey Questions

Each survey consists of five specific questions about current and expected economic conditions, both personal and national. Three indexes are then constructed: the current conditions index, the expectations index, and the overall index.

D.1 University of Michigan

Survey participants must provide qualitative answers to questions about their personal current and future financial conditions (within one year), expected general business conditions (in one year and in five years), and the current conditions for purchases of large household appliances.

Current conditions questions:

1. Do you think now is a good or bad time for people to buy major household items? [good time to buy/uncertain, depends/bad time to buy]
2. Would you say that you (and your family living there) are better off or worse off financially than you were a year ago? [better/same/worse]

Expectations questions:

3. Now turning to business conditions in the country as a whole - do you think that during the next twelve months, we'll have good times financially or bad times or what? [good times/uncertain/bad times]
4. Looking ahead, which would you say is more likely - that in the country as a whole we'll have continuous good times during the next five years or so or that we'll have periods of widespread unemployment or depression, or what? [good times/uncertain/bad times]
5. Now looking ahead - do you think that a year from now, you (and your family living there) will be better off financially, or worse off, or just about the same as now? [better/same/worse]

D.2 Conference Board

Respondents must provide qualitative responses to questions about current and future general business conditions (in six months), current and future job availability, and their income prospects.

Current conditions questions:

1. How would you rate present general business conditions in your area? [good/normal/bad]
2. What would you say about available jobs in your area right now? [plentiful/not so many/hard to get]

Expectations questions:

3. Six months from now, do you think business conditions in your area will be [better/same/worse]?
4. Six months from now, do you think there will be [more/same/fewer] jobs available in your area?
5. How would you guess your total family income to be six months from now? [higher/same/lower]



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